



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/582,903

11/17/2006

Josef Pozivil

M03B334

5002

20411 7590 01/04/2012
The BOC Group, Inc.
575 MOUNTAIN AVENUE
MURRAY HILL, NJ 07974-2082

EXAMINER

BAYOU, AMENE SETEGNE

ART UNIT

PAPER NUMBER

3746

MAIL DATE

DELIVERY MODE

01/04/2012

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/582,903	Applicant(s) POZIVIL ET AL.	
	Examiner AMENE BAYOU	Art Unit 3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 September 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 5) ☒ Claim(s) 1,6,7 and 9-12 is/are pending in the application.
- 5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 1,6,7 and 9-12 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☒ The drawing(s) filed on 13 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 6, 7, 9-12 are rejected under 35 U.S.C 103(a) as being unpatentable over Jones (3857245) in view of Oka (JP 2005265170).

In re claim 1 Jones discloses a compressor system including:

Rotary liquefied natural gas boil-off compressor (figure 1 and column 1, lines 1-2) comprising **at least two compression stages (10a,10b,10c)** in series, **a gas passage (clearly shown in the figure and is implicit)** passing through the series of **compression stages (10a,10b,10c)**, the **gas passage** extending through and being in heat exchange relationship with **at least one cooling means (the cooling means is a directly inject cryogenic LNG means between the compressor stages as described in column 4, lines 26-28.)** disposed between the **compression stages (10a,10b,10c)**, wherein the **at least one cooling means** is a **cryogenic cooling means (as described in column 4, lines 26-28 the cooling means is a directly inject cryogenic LNG means and therefore it is a cryogenic system)**; wherein the cryogenic cooling means further comprises direct cooling means, a chamber in the direct cooling means, an inlet for the chamber for introduction of the cryogenic coolant to the chamber (the cooling means is a directly inject cryogenic LNG means between

Art Unit: 3746

the compressor stages as described in column 4, lines 26-28. Since the LNG is injected the space in to which it is injected is considered as the chamber. The supply line to the chamber is therefore an inlet to the chamber).

Jones fails to teach about the use of valve between the compressor stages and also fails to teach a liquid particle separator vessel in communication with an outlet of the cryogenic cooling means.

Oka teaches a similar gas liquefaction apparatus wherein a **cooling means (boil of gas mixed at the suction side of the compressors as shown in figure 2 and detailed in paragraphs [0043] to [0047])** having **valve means (69,71)**, for controlling flow of coolant into the cooling means in response to the inlet temperature of the **compression stage (via controlling thermometers 51 and 53 as discussed in paragraphs [0043] to [0045])** downstream of the cooling means to maintain inlet temperature at a temperature between chosen sub –ambient temperature limits, an outlet of the cooling means is in communication with a vessel (67; figure 2) adapted to disengage particles of liquid from natural gas (67 is a separator as discussed in paragraph [0045]). In addition vessel 33 is also liquid separator as stated in paragraph [0037]), the vessel having a vessel outlet for the natural gas in communication with the compression stage next in series (which is compressor stage 31).

It would have been obvious to one skilled in the art at the time the invention was made to have modified the compressor of Jones by including a temperature controlled valving apparatus between the compressor stages and by attaching a liquid particle separator as taught by Oka in order to regulate the temperature of the compressed gas

Art Unit: 3746

at desired output temperature and to prevent liquid or other particles from entering the compressor chamber that would have otherwise caused compressor damage.

In re claim 6 Jones in column **4, lines 26-28** clearly stated that the direct injection cooling system can be installed before or between the stages.

In re claim 7 Jones in figure 1 discloses at least **three compressor stages (10)** in series.

In re claim 9 Jones in figure 1 discloses **cryogenic cooling means (26)** downstream of the **final compression stage (10c)**. Please note that as stated in the rejection of claim 1 and as described in column 4, lines 26-28 the cooling means is a directly inject cryogenic LNG means and it is clearly pointed out that the cryogenic cooling can be done after the final stage (10c).

In re claim 10 Oka in figure 2 discloses that there is a **cryogenic cooling means** upstream of the first compression stage (**which is the coolant supplied via valve 69 and mixed with the incoming gas as shown in figure 2**). It would have been obvious to one skill in the art at the time the invention was made to have added a cooling means upstream of the first compressor of Jones as taught by Oka in order to further lower the temperature of the incoming gas as desired.

Art Unit: 3746

In re claim 11 Jones as modified discloses the claimed invention since the claimed “compressor” does not specify which compressor stage comprise an intermediate inlet and therefore the inlet to both compressors is considered as forced due to the fact that the gas is supplied in assisted manner (such as by pump 3 in Jones) and is in continuous cycle operating system.

In re claim 12 Jones in view of Oka discloses the claimed invention:

Jones discloses:

A liquefied natural gas storage tank (1;figure 1) having an outlet (13) for boiled-off natural gas (column 3,lines 34-40) communicating with the compressor (3;and then to 10 as stated in column 3,lines 34-40 and shown in figure 1), the cryogenic cooling means (the cooling means is a directly inject cryogenic LNG means between the compressor stages as described in column 4,lines 26-28) in communication with the liquefied natural gas in the storage tank (1).

Response to Arguments

3. Applicant's arguments, see pages 5-9, filed September 09.2011, with respect to the rejection(s) of claim(s) 1,6,7,9-12 under 35 U.S.C 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Jones (3857245) and Oka (JP 2005265170).

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amene S. Bayou whose telephone number is 571-270-3214. The examiner can normally be reached on Monday-Thursday, 8:00 am-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on 571-272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/
Supervisory Patent Examiner, Art
Unit 3746

/Amene S Bayou/

Examiner, Art Unit 3746

Application/Control Number: 10/582,903
Art Unit: 3746

Page 7